[Document Name] Abstract
[Abstract]
[A technical problem] It troubles, there is nothing as if, it is more exact, and this invention offers the search equipment corresponding to between pictures which can ask for dense high correspondence of reliability of coinciding the optic axis of a pattern projection optical system and a photography optical system, efficiently more, and the search method corresponding to between pictures.
[Means for Solution] A pattern projection image input means to input the picture group which photoed the candidate for photography on which it is search equipment corresponding to between pictures which searches for correspondence between several pictures from which a viewpoint differs according to one mode of this invention, and the predetermined pattern was projected from several different viewpoints, An image input means to input the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, Compare the picture group inputted by said pattern projection picture power means with the picture group inputted by said image input means, and one of picture groups are chosen for every field on a predetermined standard. The search equipment corresponding to between pictures characterized by having the degree computer means of similar which calculates the degree of similar for every ****** field the whole pixel between pictures, and a search means to search for a corresponding pixel group or a corresponding field group based on the degree of similar calculated by said degree computer means of similar is offered.
[A selection figure] drawing 2

[Translation done.]

[Document Name] Description

[Title of the Invention] The search equipment corresponding to between pictures, and the search method corresponding to between pictures

[Claim(s)]

[Claim 1] A pattern projection image input means to input the picture group which photoed the candidate for photography on which it is search equipment corresponding to between pictures which searches for correspondence between several pictures from which a viewpoint differs, and the predetermined pattern was projected from several different viewpoints, An image input means to input the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, Compare the picture group inputted by said pattern projection picture power means with the picture group inputted by said image input means, and one of picture groups are chosen for every field on a predetermined standard. Search equipment corresponding to between pictures characterized by having the degree computer means of similar which calculates the degree of similar for every ****** field the whole pixel between pictures, and a search means to search for a corresponding pixel group or a corresponding field group based on the degree of similar calculated by said degree computer means of similar.

[Claim 2] A pattern projection image input means to input the picture group which photoed the candidate for photography on which it is search equipment corresponding to between pictures which searches for correspondence between several pictures from which a viewpoint differs, and predetermined PATA 1 N was projected from several different viewpoints, In the picture group inputted by image input means to input the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, and said pattern projection image input means The degree computer means of similar which calculates each pixel between pictures, or the degree of similar for every field, and the picture inputted by said pattern projection image input means, A degree recalculation judging means of similar to compare the picture inputted by said image input means, and to judge the necessity for recalculation of the degree of similar for every field, In the picture group inputted by said image input means about the field where the necessity for recalculation was accepted by said degree recalculation judging means of similar Search equipment corresponding to between pictures characterized by having a search means to search for a corresponding picture group or a corresponding field group, based on the degree of similar calculated by a degree recalculation means of similar to recalculate each pixel between pictures, or the degree of similar for every field, and said degree computer means of similar and said degree recalculation means of similar.

[Claim 3] The pattern projection image input process of inputting the picture group which photoed the candidate for photography on which it is the search method corresponding to between pictures of searching for correspondence between several pictures from which a viewpoint differs, and the predetermined pattern was projected from several different viewpoints, The image input process which inputs the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, Compare the picture group inputted by said pattern projection image input process with the picture group inputted by said image input process, and one of picture groups are chosen for every field on a predetermined standard. Search ****** corresponding to between pictures characterized by having the degree calculation process of similar which calculates every pixel between pictures, and the degree of similar for every field, and the search process which searches for a corresponding picture group or a corresponding field group based on the degree of similar calculated by said degree calculation process of similar.

[Claim 4] The pattern projection image input process of inputting the picture group which photoed the candidate for photography on which it is the search method corresponding to between pictures of searching for correspondence between several pictures from which a viewpoint differs, and the predetermined pattern was projected from several different viewpoints, In the picture group inputted by the image input process which inputs the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, and said pattern projection image input process The degree calculation process of similar which calculates each pixel between pictures, or the degree of similar for every field, and the picture inputted by said pattern projection image input process, The degree recalculation judging process of similar of comparing the picture inputted by said image input process, and judging the necessity for recalculation of the degree of similar for every field, In the picture group inputted by said image input process about the field where the necessity for recalculation was accepted by said degree recalculation judging process of similar The search method corresponding to between pictures characterized by having the search process which searches for a corresponding picture group or a corresponding field group based on the degree of similar calculated by the degree recalculation process of similar which recalculates each pixel between pictures, or the degree of similar for every field, and said degree calculation process of similar and said degree recalculation process of similar.

[Claim 5] In comparison with the picture into which said degree recalculation judging process of similar was inputted by said pattern projection image input process, and the picture inputted by said image input process The search method corresponding to between pictures according to claim 4 characterized by judging the state of a shadow or halation and this judging the necessity for recalculation of the degree of similar by measuring luminosity or chroma saturation.

[Claim 6] Said degree recalculation judging process of similar a pattern by the projected picture and the picture which has not been projected The field where the difference of luminosity is higher than a certain threshold, Or the search method corresponding to between pictures according to claim 5 that the difference of chroma saturation is characterized by judging at least one field of the fields higher than a certain threshold as a shadow field by the picture which projected the pattern, and the

picture which has not been projected.

[Claim 7] The field which has not been saturated with the picture which said degree recalculation judging process of similar has not projected although luminosity is mostly saturated with the picture which projected the pattern, Or the search method corresponding to between pictures according to claim 5 that the difference of chroma saturation is characterized by judging at least one field of the fields higher than a certain threshold as a halation field by the picture which projected the pattern, and the picture which has not been projected.

[Claim 8] As opposed to the field where the degree of similar from which said degree recalculation judging process of similar was acquired by said degree calculation process of similar is low The search method corresponding to between pictures according to claim 5 characterized by performing the necessity judging of recalculation of the degree of similar by judging whether the picture which projected the pattern, and the picture which has not been projected compare luminosity and chroma saturation, and a shadow and halation have arisen by pattern projection.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the search equipment corresponding to between pictures, and the search method corresponding to between pictures, and especially When asking for the corresponding pixel or the corresponding field between pictures For example, it is related with the search equipment corresponding to between pictures which adopted the technology which can be used for the equipment which extracts distance information, or the technology which can be used for the congruent-points search equipment in combination of a panorama photograph, and the search method corresponding to between pictures by asking for correspondence between the pictures from which a viewpoint differs.

[0002]

[Description of the Prior Art] Many techniques of asking for the corresponding pixel or corresponding field between several pictures from which a viewpoint differs are proposed conventionally.

[0003] The area base matching method which asks for correspondence also in it using a pixel or the local information near the field is applied well.

[0004] In the proposed method, normalization correlation is conventionally calculated with the gray level near the attention pixel, and the gray level near the pixel of the other pictures which should search for correspondence. Create the degree map of similar and correspondence with the high degree of similar is considered as "seed

correspondence" also especially in it. By investigating the degree of similar about the neighborhood, newly considering the correspondence as seed correspondence, if it is a certain degree of similar more than fixed, and performing same processing also about the new seed correspondence Furthermore, new seed correspondence is generated. [a correspondence map] The 1st method of creating (Qian Chen) & Gerad Medioni and "A volumetric Stereo Matching Method:Applicaion to There are Image-Based Modeling, "Proceedings on Computer Vision and Pattern Recognition Conferenc'99, Vol.1, pp.29-34, and June 1999.

[0005] In this case, when it is judged that the enough information for asking for correspondence is not given, the 2nd method of adding projection information is in the candidate for photography about a pattern ("stereo ********** JP,H4-25758,B).

[0006]

[Problem(s) to be Solved by the Invention] However, by the 1st method mentioned above, when the enough information for asking for correspondence is not given, there is a problem that it may be unable to ask for correspondence correctly.

[0007] In order [moreover,] to judge "enough information is not given" by the 2nd method mentioned above Since the standard that it is lower than a threshold with the degree of maximum similar, or the peak of the degree of maximum similar is not sharp is adopted, for example, when a pattern exists in the candidate for photography repeatedly, there is a problem that matching may be unable to ask correctly.

[0008] Moreover, by this 2nd method, there is a problem that matching may be unable to ask correctly in the field which a shadow and halation have produced by pattern projection.

[0009] Furthermore, by this 2nd method, in order to make as small as possible the field which the shadow has produced, correspondence of coinciding the optic axis of a pattern projection optical system and a photography optical system is needed.

[0010] [this invention / viewpoints / several / which were made in view of the above-mentioned situation, and are different / each] A photograph is taken in both the state where it has not projected with the state where the pattern was projected. When the picture which carried out pattern projection for every field or pixel is compared with the picture which has not projected the pattern and correspondence calculates the degree of similar using the direction for which it can ask correctly It troubles, there is nothing as if, and it is more exact, and aims at offering the search equipment corresponding to between pictures which can ask for dense high correspondence of reliability of coinciding the optic axis of a pattern projection optical system and a photography optical system, efficiently more, and the search method corresponding to between pictures.

[0011]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem according to this invention (1) It is search equipment corresponding to between pictures which searches for correspondence between several pictures from which a viewpoint differs., A pattern projection image input means to input the picture group which photoed the candidate for photography on which the predetermined pattern was projected from several different viewpoints, An image input means to input the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, Compare the picture group inputted by said pattern projection picture power means with the picture group inputted by said image input means, and one of picture groups are chosen for every field on a predetermined standard. The search equipment corresponding to between pictures characterized by having the degree computer means of similar which calculates the degree of similar for every ****** field the whole pixel between pictures, and a search means to search for a corresponding pixel group or a corresponding field group based on the degree of similar calculated by said degree computer means of similar is offered.

[0012] Moreover, in order to solve the above-mentioned technical problem according to this invention (2) It is search equipment corresponding to between pictures which searches for correspondence between several pictures from which a viewpoint differs., A pattern projection image input means to input the picture group which photoed the candidate for photography on which predetermined PATA 1 N was projected from several different viewpoints, In the picture group inputted by image input means to input the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, and said pattern projection image input means The degree computer means of similar which calculates each pixel between pictures, or the degree of similar for every field, and the picture inputted by said pattern projection image input means, A degree recalculation judging means of similar to compare the picture inputted by said image input means, and to judge the necessity for recalculation of the degree of similar for every field, In the picture group inputted by said image input means about the field where the necessity for recalculation was accepted by said degree recalculation judging means of similar The search equipment corresponding to between pictures characterized by having a search means to search for a corresponding picture group or a corresponding field group, based on the degree of similar calculated by a degree recalculation means of similar to recalculate each pixel between pictures or the degree of similar for every field, and said degree computer means of similar and said degree recalculation means of similar is offered.

[0013] Moreover, in order to solve the above-mentioned technical problem according to this invention (3) It is the search method corresponding to between pictures of searching for correspondence between several pictures from which a viewpoint differs., The pattern projection image input process of inputting the picture group which photoed the candidate for photography on which the predetermined pattern was projected from several different viewpoints, The image input process which inputs the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, Compare the picture group inputted by said pattern projection image input process with the picture group inputted by said image input process, and one of picture groups are chosen for every field on a predetermined standard. Search ****** corresponding to between pictures characterized by having the degree calculation process of similar which calculates the

degree of similar for every ****** field the whole pixel between pictures, and the search process which searches for a corresponding picture group or a corresponding field group based on the degree of similar calculated by said degree calculation process of similar is offered.

[0014] Moreover, in order to solve the above-mentioned technical problem according to this invention (4) It is the search method corresponding to between pictures of searching for correspondence between several pictures from which a viewpoint differs., The pattern projection image input process of inputting the picture group which photoed the candidate for photography on which the predetermined pattern was projected from several different viewpoints, In the picture group inputted by the image input process which inputs the picture group which photoed the candidate for photography on which the pattern is not projected from several different viewpoints, and said pattern projection image input process The degree calculation process of similar which calculates each pixel between pictures, or the degree of similar for every field, and the picture inputted by said pattern projection image input process, The degree recalculation judging process of similar of comparing the picture inputted by said image input process, and judging the necessity for recalculation of the degree of similar for every field, In the picture group inputted by said image input process about the field where the necessity for recalculation was accepted by said degree recalculation judging process of similar The search method corresponding to between pictures characterized by having the search process which searches for a corresponding picture group or a corresponding field group based on the degree of similar calculated by the degree recalculation process of similar which recalculates each pixel between pictures or the degree of similar for every field, and said degree calculation process of similar and said degree recalculation process of similar is offered.

[0015] Moreover, in order to solve the above-mentioned technical problem according to this invention (5) [said degree recalculation judging process of similar], In comparison with the picture inputted by said pattern projection image input process, and the picture inputted by said image input process By measuring luminosity or chroma saturation, the search method given in (4) corresponding to between pictures characterized by judging the state of a shadow or halation and this judging the necessity for recalculation of the degree of similar is offered.

[0016] Moreover, in order to solve the above-mentioned technical problem according to this invention (6) [said degree recalculation judging process of similar], A pattern by the projected picture and the picture which has not been projected The field where the difference of luminosity is higher than a certain threshold, Or the search method given in (5) corresponding to between pictures by which it is characterized is offered [that the difference of chroma saturation judges at least one field of the fields higher than a certain threshold as a shadow field by the picture which projected the pattern, and the picture which has not been projected, and].

[0017] Moreover, in order to solve the above-mentioned technical problem according to this invention (7) [said degree recalculation judging process of similar], The field which has not been saturated with the picture which has not been projected although luminosity is mostly saturated with the picture which projected the pattern, Or the search method given in (5) corresponding to between pictures by which it is

characterized is offered [that the difference of chroma saturation judges at least one field of the fields higher than a certain threshold as a halation field by the picture which projected the pattern, and the picture which has not been projected, and].

[0018] Moreover, in order to solve the above-mentioned technical problem according to this invention (8) [said degree recalculation judging process of similar], By judging whether the picture on which the degree of similar obtained by said degree . calculation process of similar projected the pattern to the low field, and the picture which has not been projected compare luminosity and chroma saturation, and a shadow and halation have arisen by pattern projection The search method given in (5) corresponding to between pictures characterized by performing the necessity judging of recalculation of the degree of similar is offered.

[0019]

[Embodiment of the Invention] With reference to Drawings, the form of operation of this invention is explained below.

[0020] Drawing 1 is the perspective view showing an example of the apparatus composition of the whole to which the search equipment corresponding to between pictures by this invention and the search method corresponding to between pictures are applied.

[0021] [namely, the search equipment corresponding to between pictures according to this invention as shown in drawing 1] It consists of Image Processing Division equipment C which processes to two or more pictures photoed with the plurality or one cameras 1 and 2 which constitute the projection optical system P, the pattern projection image input means 1, and the image input means 2 for projecting a pattern, and the cameras 1 and 2 of those.

[0022] First, the form of operation of the 1st of the search equipment corresponding to between pictures by this invention and the search method corresponding to between pictures is explained.

[0023] Drawing 2 is a figure showing the constituent factor and relation of the form of operation of the 1st between the search equipment corresponding to between pictures by this invention, and the search method corresponding to between pictures.

[0024] [namely, the search equipment corresponding to between pictures according to the form of the 1st operation of this invention as shown in drawing 2] The pattern projection means P as a projection optical system mentioned above, the pattern projection image input means 1 equivalent to the cameras 1 and 2 mentioned above, and the image input means 2, It consists of the degree computer means 3 of similar included in the Image Processing Division equipment C mentioned above, a degree recalculation judging means 4 of similar, a degree recalculation means 5 of similar, and a correspondence search means 6.

[0025] Drawing 3 is the figure which added the flow of data to drawing 2.

[0026] The big flow of the algorithm of the search equipment corresponding to between pictures by this invention and the search method corresponding to between pictures is as follows.

[0027] (1) Project a pattern by the pattern projection means P, and generate the pattern projection picture group D1 from which a viewpoint differs by the pattern projection image input means 1.

[0028] (2) Generate the picture group D2 from which a viewpoint differs by the image input means 2.

[0029] (3) Compute each pixel between the picture groups D1, or the degree D3 of similar for every field in the degree computer means 3 of similar.

[0030] (4) In the degree recalculation judging means 4 of similar, judge whether a picture is compared for each [to which the picture group D1 and the picture group D2 correspond] viewpoint of every, and a shadow and halation have arisen from the change by pattern projection, and judge whether recalculation is required, also taking the result of (3) into consideration.

[0031] (5) Compute each pixel between the picture groups D2, or the degree D5 of recalculation similar for every field in the degree recalculation means 5 of similar to the field judged as recalculation being required by (4).

[0032] (6) In the correspondence search means 6, search for a pixel pair or a field pair, and ask for correspondence. [/ based on the degree D3 of similar of (3), and the degree D5 of recalculation similar of (5)]

[0033] Below, each constituent factor and its relation are explained in detail.

[0034] In addition, below, since explanation is easy, a picture is explained from two different viewpoints, but this invention is included also when a viewpoint is three or more.

[0035] The pattern coded in the shape of a lattice, the shape of a stripe, the random dot, or the color is sufficient as the pattern which the pattern projection means P projects a pattern on the candidate for photography, and is projected by this pattern projection means P, for example.

[0036] As for these patterns, it is desirable to be made so that there may be no

repetition on an epipolar line.

[0037] By this, even when a pattern is in the candidate for photography repeatedly, it can ask for exact correspondence.

[0038] Drawing 4 is a figure which illustrates some patterns projected by the pattern projection means P.

[0039] That is, the lattice-like pattern is shown by (a) of drawing 4, and the stripe-like pattern is shown by (b) of drawing 4.

[0040] However, it is clear that it is not that in which this invention receives restriction with the form of these patterns.

[0041] moreover, the picture group to which the suitable pretreatment for the picture group picturized with the digital camera etc. from 2 viewpoints which are different in the candidate for photography for which pattern projection of the pattern projection image input means 1 was carried out by the pattern projection means P, or correspondence search was performed -- respectively -- two-dimensional arrangement -- or When a picture is a color, it stores and outputs to two-dimensional arrangement for every color.

[0042] Here, the photography from a different viewpoint may be photography with two or more cameras arranged in a different position, or may move to a position which is different with one camera, and may take a photograph.

[0043] Processing of REKUTIFIKESHON, the smoothing filter for removing the noise added at the time of picture photography, a median filter, etc., etc. is included in suitable processing of a place here, for example.

[0044] Drawing 5 is the figure which expressed typically the picture of two sheets in front of REKUTIFIKESHON, and the picture of two sheets obtained by the processing.

[0045] [the picture photoed from a different viewpoint from REKUTIFIKESHON here] Based on a camera calibration parameter, operation which coincides the epipolar line of a pixel on either side for every line horizontally is meant. For example Literature "Emanue1e Trucco, Alessandro Verri, "Introductory Techniques for 3-D ComputerVision", Prentice-Hall, and New Since the details are given to Jersey, USA, and 1998", the explanation is omitted here.

[0046] And the image input means 2 is installed in the same optic axis in the pattern projection image input means 1 and each viewpoint. the picture group to which the suitable pretreatment for the picture group picturized with the digital camera etc. from different 2 viewpoints or correspondence search was performed -- respectively --

two-dimensional arrangement -- or when a picture is a color, it stores and outputs to two-dimensional arrangement for every color.

[0047] Here, you may consist of apparatus with same image input means 2 and pattern projection image input means 1.

[0048] Although it consists of apparatus with same image input means 2 and pattern projection image input means 1 and being explained below as what is the same viewpoint, these may be another apparatus and another viewpoint.

[0049] The degree computer means 3 of similar The attention pixel of the picture of one of the two of the picture group D1 from the pattern projection image input means 1 near [moreover,] The degree D3 of similar is calculated using the gray level near [which wants to compute the degree D3 of similar of another picture] the pixel, and this degree D3 of similar is outputted as arrangement of the three dimensions of the direction (u, v) of a picture in every direction, and the azimuth difference direction (d).

[0050] Drawing 6 is a figure shown in order to explain the three-dimensions arrangement.

[0051] For example, the coordinates of a right picture calculate and store the degree D3 of similar with the pixel R (i-k, j) (0<k<D) which are (i+k, j) to the pixel L (i, j) whose coordinates of a left picture are (i, j) on the basis of a left picture.

[0052] Although it is possible to use the square centering on an attention pixel, a rectangle, and a field that does not restrict circularly but is different for every pixel as near [here] the pixel, it is clear that how to decide near the pixel is not what gives this invention restriction.

[0053] Moreover, as a degree D3 of similar here, it is Li about the concentration value of the neighborhood pixel of S and a right-and-left picture in a set of the coordinates of a pixel soon, respectively, for example,

[Equation 1]

R_i ($i \in S$)、左右画像の濃度値の近傍画素内での平均をそれぞれ$\overline{L}$、$\overline{R}$とおくと、

正規化相関、

$$\frac{\sum_{i \in S}(L_i - \overline{L})(R_i - \overline{R})}{\sum_{i \in S}(L_i - \overline{L})^2 \sum_{i \in S}(R_i - \overline{R})^2}$$

差の２乗和、

$$\sum_{i \in S}(L_i - R_i)^2$$

差の絶対値の和、

$$\sum_{i \in S}|L_i - R_i|$$

差の最大値、

$$\max_i |L_i - R_i|$$

the number of the differences more than a threshold, and any one ** -- or although it is possible to change and use for every pixel accommodative, it is clear that the calculation method of the degree D3 of similar is not what gives this invention restriction.

[0054] As calculation of the degree D3 of similar here, it does not calculate directly to the picture of two sheets which is the object which computes the degree D3 of similar, for example. After computing reduction and the field considered for the degree D3 of similar to be roughly good using the obscured picture, you may use the technique (literature "JP,H7-103734,A "search equipment corresponding to a stereo"") what is called using multiplex resolution analysis which calculates the degree D3 of similar about details.

[0055] And the degree recalculation judging means 4 of similar judges the field which performs the comparison operation of the pattern projection picture group D1 and the picture group D2 corresponding to each viewpoint, and has the necessity for recalculation of the degree of similar.

[0056] Here, as a field with the necessity for recalculation, the field and halation field of the shadow by pattern projection can be considered, for example.

[0057] This halation is the phenomenon produced when there is the reflective characteristic strong against a specific direction with the candidate for photography for example, and in such a field, since this reflective direction changes with viewpoints, it is difficult to ask for exact correspondence.

[0058] As the concrete judgment method about the field and halation field of these shadows, the picture of the picture group D2 judges the field which fulfills the character in which the direction of the picture of the picture group D2 has high chroma saturation, rather than the picture of 2. picture group D1 with high luminosity as a shadow field rather than the picture of 1. picture group D1, for example.

[0059] Moreover, although luminosity is mostly saturated with the picture of 1. picture group D1, the field which fulfills the character in which the picture of chroma saturation of the picture group D2 is higher, rather than the picture of 2. picture group D1 which has not been saturated with the picture of the picture group D2 is judged as a halation field.

[0060] Here, the pixel saturated mostly shows the pixel which also takes the influence of noise into consideration and has 250 to 255 gradation sequence, for example, when expressed by 256 gradation sequence.

[0061] However, since individual specificity is in the noise characteristic with a camera about this concrete value, it is necessary to decide each time.

[0062] You may make it use a luminosity value, and the difference and ratio of chroma saturation for the judgment of these character, for example.

[0063] Moreover, in order to increase judgment speed, you may be made to perform a primary judging within the picture of the picture group D1.

[0064] For example, by the judgment of a shadow field, the luminosity and chroma saturation of a picture of the picture group D1 compare with the picture of the picture group D2 about a low field.

[0065] Moreover, by the judgment of a halation field, or the luminosity of the picture of the picture group D1 is saturated, chroma saturation compares with the picture of the picture group D2 about a low field.

[0066] Or in the judgment of a shadow field, and the judgment of a halation field, you may limit to the field where the degree of similar obtained by the degree computer means 3 of similar is low.

[0067] However, it is clear that these judgment methods are not what gives this invention restriction.

[0068] And by the degree recalculation judging means 4 of similar, to the field where the necessity for recalculation was accepted, the degree recalculation means 5 of similar computes the degree of similar like the degree computer means 3 of similar to the inside of the corresponding field in the picture group D2, and outputs it as arrangement of three dimensions.

[0069] Moreover, the correspondence search means 6 searches for correspondence from the degree D3 of similar from the degree computer means 3 of similar, and the degree of recalculation similar from the degree recalculation means 5 of similar, and

outputs a correspondence map.

[0070] for example, the correspondence search means 6 is matched with the high pixel of a possibility of obtaining also about the attention pixel of the picture used as a standard, and corresponding most in consideration of the reliability of the degree of similar, and the degree of similar in picture of one of the two.

[0071] The correspondence map here can consider the azimuth difference map (two-dimensional arrangement) on which the pixel on the picture of the right corresponding to the attention pixel of a left picture plotted which has shifted on the left picture on the basis of the left picture, for example.

[0072] However, it is clear that the output method of this correspondence map is not what gives this invention restriction.

[0073] [and above search equipment corresponding to between pictures of this invention and search methods corresponding to between pictures] When asking for the corresponding pixel or the corresponding field between pictures especially, while being the technology which can be used for the equipment which extracts distance information by, for example, asking for correspondence of ****** from which a viewpoint differs, it is the technology which can be used for the ******** matter equipment in combination of a panorama photograph.

[0074]

[Effect of the Invention] According to this invention of Claim 1 and three descriptions, even when the enough information for asking for correspondence about the candidate for photography on which the pattern was projected is not given, it can ask for correspondence.

[0075] Moreover, according to this invention of Claim 1 and three descriptions, the feature is carrying out clearly by the picture on which the pattern was projected in the degree computer means of similar, and the picture on which the pattern is not projected. While a possibility that correspondence can ask correctly chooses the higher one for every field and decreasing the influence of the shadow and halation which are produced by performing pattern projection by calculating the degree of similar, it can ask for correspondence more correctly also from a repetition pattern etc.

[0076] Furthermore, according to this invention of Claim 1 and three descriptions, the troublesomeness of coinciding the optic axis of a pattern projection optical system and a photography optical system is also canceled by saying that the influence of a shadow or halation can be decreased.

[0077] Moreover, according to this invention Claim 2, 4 and 5, or given in eight, even when the enough information for asking for correspondence about the candidate for

photography on which the pattern was projected is not given, it can ask for correspondence.

[0078] Moreover, according to this invention Claim 2, 4 and 5, or given in eight, the field of the shadow which is the evil produced by performing pattern projection in the degree recalculation judging means of similar, or halation is judged. While decreasing the influence of a shadow or halation by recalculating the degree of similar by the picture which has not carried out pattern projection in the degree recalculation means of similar based on the judgment, it can ask for correspondence more correctly also from a repetition pattern etc.

[0079] Furthermore, according to this invention Claim 2, 4 and 5, or given in eight, the troublesomeness of coinciding the optic axis of a pattern projection optical system and a photography optical system is also canceled by saying that the influence of a shadow or halation can be decreased.

[0080] therefore, [according to this invention / viewpoints / several / different / each] as explained above A photograph is taken in both the state where it has not projected with the state where the pattern was projected. When the picture which carried out pattern projection for every field or pixel is compared with the picture which has not projected the pattern and correspondence calculates the degree of similar using the direction for which it can ask correctly It troubles, there is nothing as if, it is more exact, and the search equipment corresponding to between pictures which can ask for dense high correspondence of reliability of coinciding the optic axis of a pattern projection optical system and a photography optical system, efficiently more, and the search method corresponding to between pictures can be offered.

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the perspective view showing an example of the apparatus composition of the whole to which the search equipment corresponding to between pictures by this invention and the search method corresponding to between pictures are applied.

[Drawing 2] Drawing 2 is a figure showing the constituent factor and relation of the form of operation of the 1st between the search equipment corresponding to between pictures by this invention, and the search method corresponding to between pictures.

[Drawing 3] Drawing 3 is the figure which added the flow of data to drawing 2.

[Drawing 4] Drawing 4 is a figure which illustrates some patterns projected by the pattern projection means P of drawing 2.

[Drawing 5] Drawing 5 as a suitable pretreatment for the picture group picturized with the digital camera etc. from different 2 viewpoints, or correspondence search for [in

which pattern projection was carried out by the pattern projection means P of drawing 2] photography The picture of two sheets before REKUTIFIKESHON processing, It is the figure which expressed typically the picture of two sheets obtained by the processing.

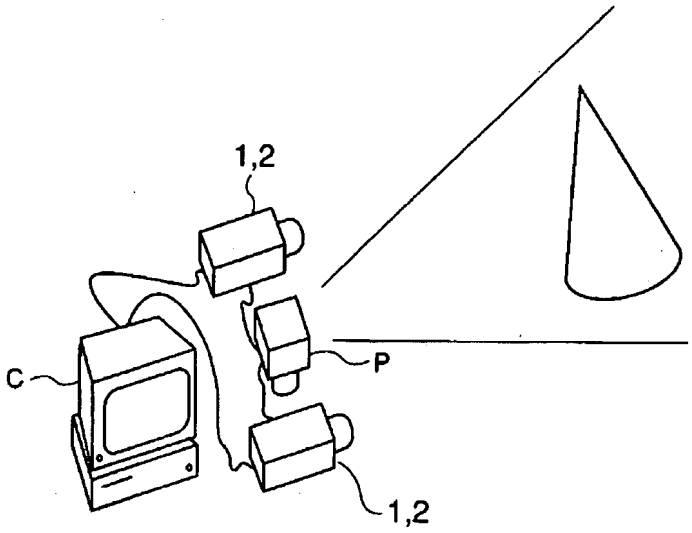
[Drawing 6] Drawing 6 is the figure shown in order to explain the three-dimensions arrangement at the time of arranging and outputting the degree D3 of similar by which the degree computer means 3 of similar of drawing 2 was calculated to the three dimensions of the direction (u, v) of a picture in every direction, and the azimuth difference direction (d).

[Description of Notations] P [-- Image Processing Division equipment, 3 / -- The degree computer means of similar 4 / -- The degree recalculation judging means of similar, 5 / -- The degree recalculation means of similar, 6 / -- Correspondence search means.] -- A projection optical system (pattern projection means), 1 -- A pattern projection image input means, 2 -- An image input means, C

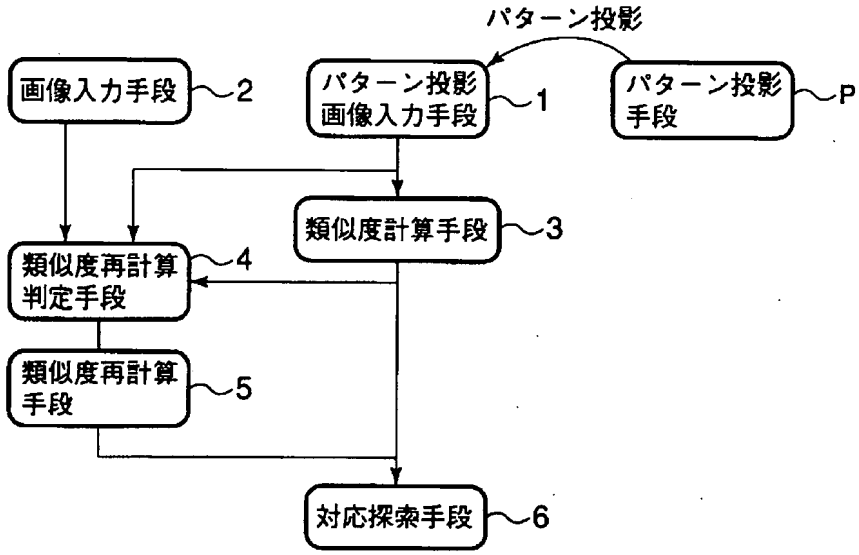
[Translation done.]

[Document Name] Drawings

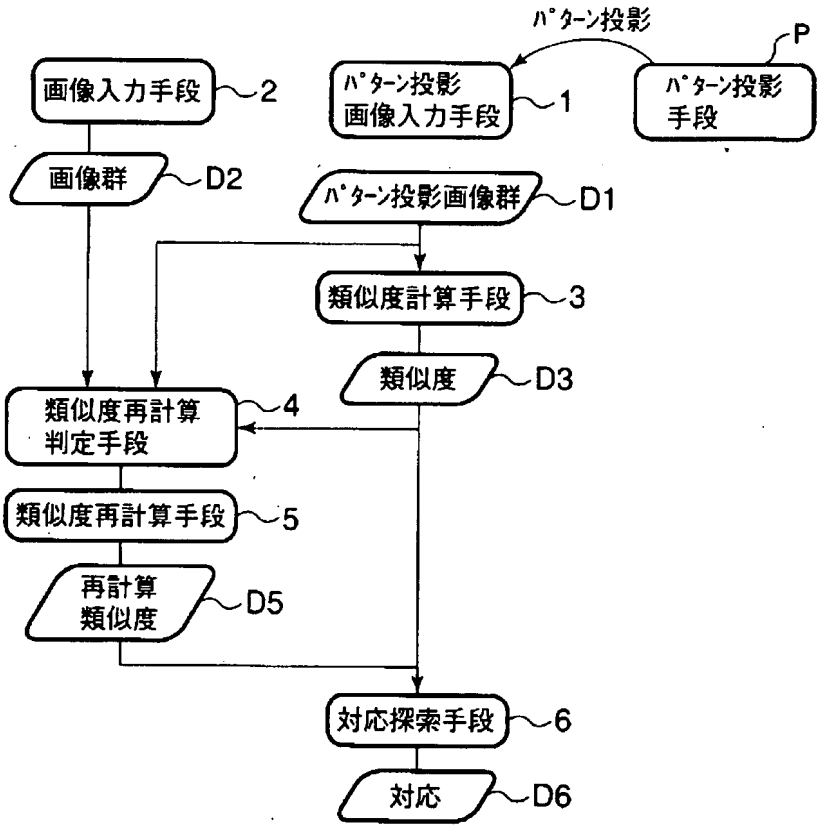
[Drawing 1]



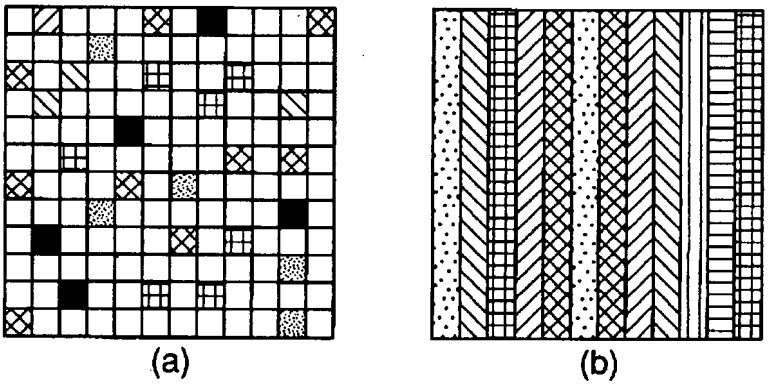
[Drawing 2]



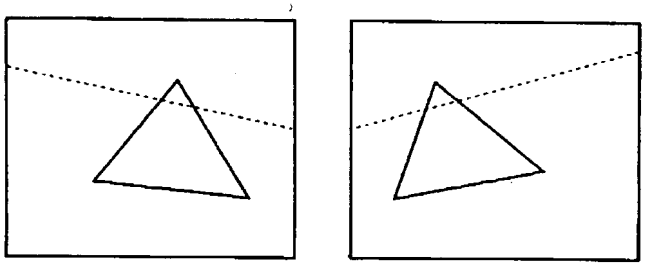
[Drawing 3]



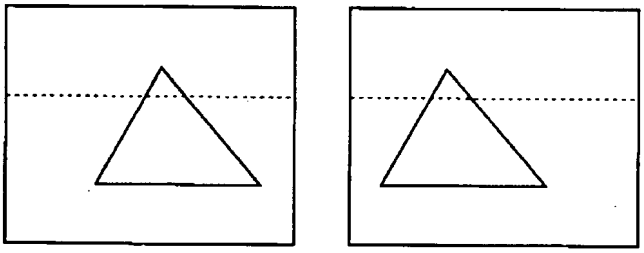
[Drawing 4]



[Drawing 5]

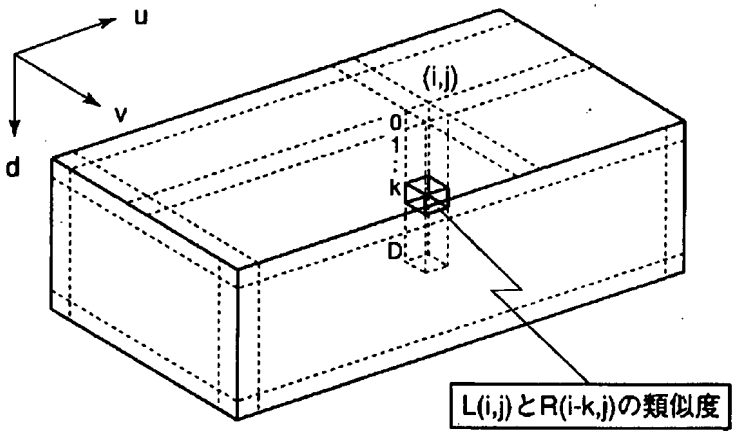


(a) レクティフィケーション前



(b) レクティフィケーション後

[Drawing 6]



[Translation done.]